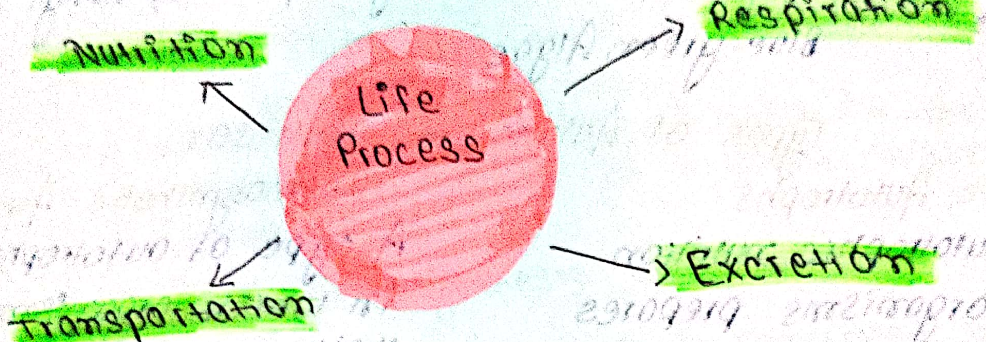
Life Processes

Life processes are the fundamental and necessary activities performed by living organisms to sustain & continue life.

Example: Activities like breathing eating and excreting are life processes unlike using a phone which isn't.

Core life processes for maintaining life



Types of organism Based on Cell Structure

- Unicellular organisms
  Made up of a single cell
  eg - Amoeba
- Multicellular organisms
  Composed of many cells
  eg - Plants, Humans

Q1 Why do living organisms require energy?

a. To reproduce only
b. For movement only
c. To perform all life activities
d. To sleep

Nutrition

Nutrition is the process of obtaining and utilizing food for growth energy and repair.

For supports: Energy Production
Growth & Development
Tissue Repair.

Nutrition

Nutritional Components of food:

- Carbohydrates
- Proteins
- Fats
- Vitamins & minerals

Types of Nutrition

Autotrophic Nutrition

Organisms synthesize their own food.

eg- Green Plants, Algae, Cynobacteria, e.t.c

Blue-green Algae

Heterotrophic Nutrition

Organisms rely on others for food.

eg- Animals, fungi

Types of Autotrophic Nutrition.

Photosynthetic Autotrophs

A type of autotrophic nutrition in which organisms prepares their own food by utilizing light energy.

example

Green plants, Algae
Cynobacteria, Euglena
Blue-green Algae

Chemosynthetic Autotrophs

A type of autotrophic nutrition in which organisms prepares their own food by utilizing chemical energy.

Example:

Purple Sulfur Bacteria

Photosynthesis

$$\boxed{6CO_2 + 6H_2O \xrightarrow[\text{chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2}$$

It is a Biochemical process through which green plants, using sunlight, water and carbon dioxide, synthesize food in the form of glucose and release oxygen as a by-product.

Raw Materials.

Sunlight: It is an organic material.

Chlorophyll: Sunlight absorbed by Chlorophyll.

CO_2: Enters through stomata and oxygen O_2 is released as by- product through stomata on leaf.

Water: Water + Dissolved minerals like nitrogen, phosphorus etc Are taken up by the roots of the soil.

Site of Photosynthesis

Chloroplasts: are the site of photosynthesis which are green pigmented cell organelles containing chlorophyll.

Main Events of Photosynthesis

Absorption of light energy by chlorophyll.

Conversion of light energy into chemical energy + splitting (breaking) of water into hydrogen and oxygen.

Reduction of CO_2 to carbohydrates

Note:

Plants store glucose in the form of "Starch" while Human store glucose in the form of glucogen

Stomata

Stomata are small pores like structure on leaf surfaces.

Functions

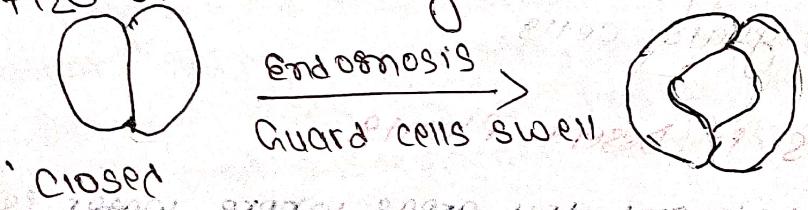
Transpiration: Transpiration →Removing extra water is the loss of water in the form of water vapour from the parts of a plant, mainly through the stomata of leaves.

- Gas exchange during photosynthesis and transpiration.
- The opening and closing of the pore is controlled by kidney bean shaped cells called guard cells.

Opening of Stomata.

When guard cells uptake water from surrounding cells, they swell to become a turgid body, which enlarges the pore in between (stomatal opening).

H_2O enters into guard cell



Closing of Stomata.

While when water is released, they become flaccid shrinking to close the pore (stomatal closing).

H_2O moves out of the guard cell.

Q. Which of the following isn't required for photosynthesis?

a. Water b. CO_2 c. oxygen d. Sunlight

Q Site of Photosynthesis is
a. Golgi body
b. Mitochondria
c. Chloroplast
d. Cytoplasm

Q Events that doesn't occur in photosynthesis is
a. Absorption of light energy by chlorophyll
b. Reduction of carbon dioxide to carbohydrates
c. Oxidation of carbon to carbon dioxide
d. Conversion of light energy to chemical energy.

Q which pigment is necessary for photosynthesis?
a. Hemoglobin c. Melanin
b. Chlorophyll d. Iodine

Q Which is correct eqn for photosynthesis?

$$CO_2 + H_2O \longrightarrow C_6H_{12}O_6 + O_2$$

Q Which one of the following conditions is TRUE for the stomata?
a. water flows in
b. Gaseous exchange occurs
c. water flows out of guard cells
d. sugar collects in guard cells.

Photosynthesis in Desert Plants.

- Desert plants grow in hot and dry areas where water is scarce.
- They open stomata at night to take in CO_2
- CO_2 is stored as weak acid in the plant.
- During the day, stomata remain closed to prevent water loss.
- The stored acid releases CO_2 for photosynthesis in sunlight

Q. opening and closing of stomata is due to.

a. High pressure of gases inside the cells

b. Movement of water in and out of the guard cells

c. Stimulus of light in the guard cells.

d. Diffusion of CO_2 in and out of the guard cells.

Types of Heterotrophic Nutrition.

Holozoic Nutrition

organisms take in solid food, digest it internally, and absorb nutrients.

food is digested and absorbed inside the animal body.

example

Animals

- Herbivores (cow, goat, deer)
- Carnivores (Lion, Tiger)
- Omnivores (Human beings)

Unicellular organisms

Amoeba & Paramecium

Types of Heterotrophic Nutrition

Parasitic Nutrition

Parasitic Nutrition is a type of Heterotrophic nutrition where an organism, the parasite, obtains nutrients from another living organism, the host, without killing it. The parasite lives on or inside the host and derives its food and sustenance from it, often causing harm to the host

eg — Tapeworm
Lice
Ticks
Leech
Ascaris
Cuscuta (Plant).

Types of Heterotrophic Nutrition

Saprophytic Nutrition.
organisms feed on dead and decaying matter by secreting enzymes outside.
food is digested externally and then nutrients are absorbed.

eg – Bread mould
Mushroom
Yeast

Q Which of the following shows saprophytic nutrition?
a. Amoeba [✓ b. Yeast] c. Cuscuta d. Lion

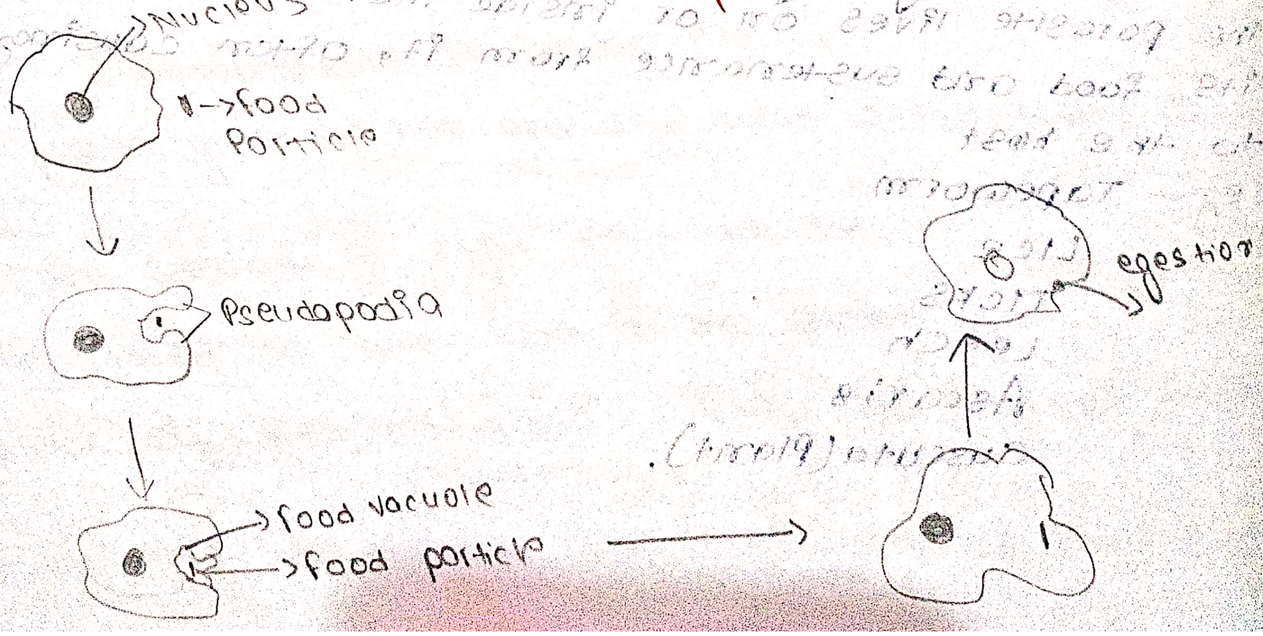
Q Which of the following is a parasitic plant?
a. Mushroom c. Rose
[✓ b. Cuscuta] d. Neem

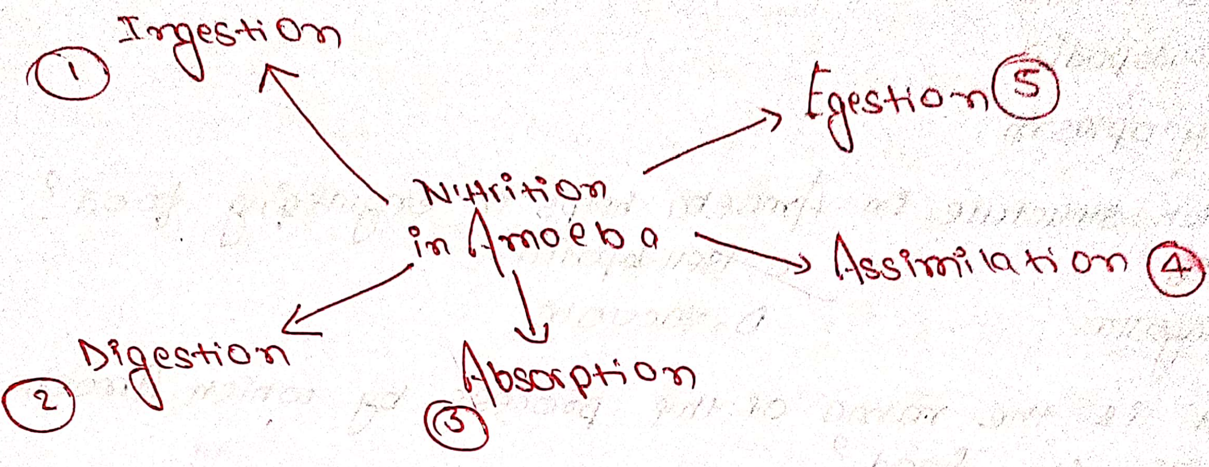
Q What type of nutrition is shown by Amoeba, Mushroom and Cuscuta?

a. Saprophytic, Parasitic & Holozoic
b. Parasitic, Holozoic and Saprophytic
[✓ c. Holozoic, Saprophytic, Parasitic]
d. Holozoic, Parasitic & Saprophytic

Nutrition in Amoeba & Paramecium

Nutrition in Amoeba


Nucleus
food Particle
Pseudopodia
food vacuole
food particle
egestion



Step of Nutrition in Amoeba

Amoeba uses pseudopodia to engulf food
Enzymes from the cytoplasm digest food inside a food vacuole
Digested food is absorbed and assimilated
undigested waste is expelled from the body.

Holozoic nutrition in Amoeba

1. Amoeba senses food
2. Pseudopodia surround the food.
3. The food is enclosed in a food vacuole (food + water).
4. Enzymes from the cytoplasm are secreted into the food vacuo
5. food is digested and soluble materials are absorbed and assimil (used up).
6. Undigested waste is expelled.

Nutrition in Paramecium.

Paramecium is a unicellular that lives in water & moves and feeds using hair-like str. called cilia.

- food enters through the oral groove.
- food vacuole formation & enzymatic digestion
- Nutrients absorbed, undigested food expelled

Q In Amoeba food is digested in
A. Nucleus
B. food vacuole
C. Pseudopodia
D. Cytoplasm

Q which structure in Amoeba helps in engulfing food?
A. Cilia
B. Flagella
C. Pseudopodia
D. Vacuole.

Q What is the name of the process by which Amoeba engulfs its food?
A. Photosynthesis
B. Phagocytosis
C. Fermentation
D. Diffusion

Q How do Amoeba and Paramecium obtain their food?

Amoeba uses pseudopodia (false-feet) to engulf food particles, forming a food vacuole. Inside the vacuole, enzymes digest the food.

Paramecium uses cilia to sweep food into a specific spot called the oral groove, where it is ingested & digested in food vacuoles.

Nutrition in Human Beings.

1. Ingestion

The process of taking food into the body through the mouth.

2. Digestion

The process of breaking down complex food into simpler, soluble forms that can be absorbed.

3. Absorption

The process of transporting digested food into the blood or body fluids.

4. Assimilation

The process of using absorbed food for energy, growth and repair in body cells.

5. Egestion

The process of removing undigested and unabsorbed food from the body as waste.

Nutrition in Human Beings

Mouth ⟶ oesophagus ⟶ Stomach ⟶ Small intestin
Large instestine ⟶ Rectum ⟶ Anus

Human Digestive System

Alimentary canal.

- The Human alimentary canal is a long, tube-shaped structur with varying diameters.
- It begins at the mouth and ends at the anus.
- Major parts of the alimentary Canal include: Mouth, oesopha stomach, Small intestine, large intestine.

Accessory organs

- Organs that helps in Digestion but no food passes through them (liver, pancreas, salivary glands, e.t.c)

Mouth (Buccal Cavity)

- food intake begins with ingestion through the mouth.
- Teeth crush and grind the food into smaller pieces to aid in swallowing and digestion.
- Saliva, secreted by salivary glands moistens the food, making it easier to swallow.
- Saliva contains the enzyme salivary amylase, which begins the digestion of starch into simpler sugars.

- The muscular tongue helps in mixing the food with saliva and rolls it into a ball like structure called bolus.

- The tongue pushes the bolus to the back of the mouth to be swallowed easily.

- The initial phase of digestion is called mechanical & chemical digestion in the mouth.

oesophagus(food Pipe)

- After swallowing, the food enters the oesophagus, a muscular tube approximately 25cm in length.

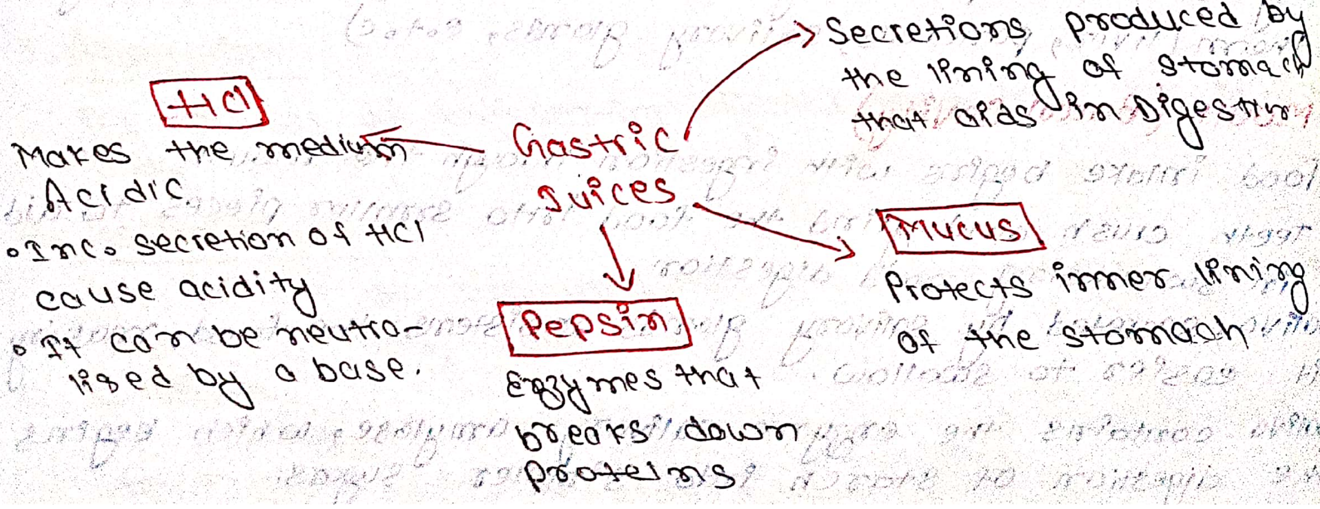
- It has sphincter(valve) at both ends to regulate the flow of food.

- The primary role of the oesophagus is to carry food and liquids from the mouth to the stomach.

- food is moved along the oesophagus through peristaltic movements — a series of rhythmic muscle contractions.

Stomach

- The stomach is a thick-walled, J-shaped organ that connects the oesophagus to the small intestine.
- Its lining secretes mucus, hydrochloric acid (HCl) & digestive enzymes (pepsin).
- Enzymatic in gastric juice help breakdown proteins.
- HCl aids protein digestion and kills harmful bacteria
- Mucus protects the stomach lining the HCl.



Gastric Juices → Secretions produced by the lining of stomach that aids in Digestion

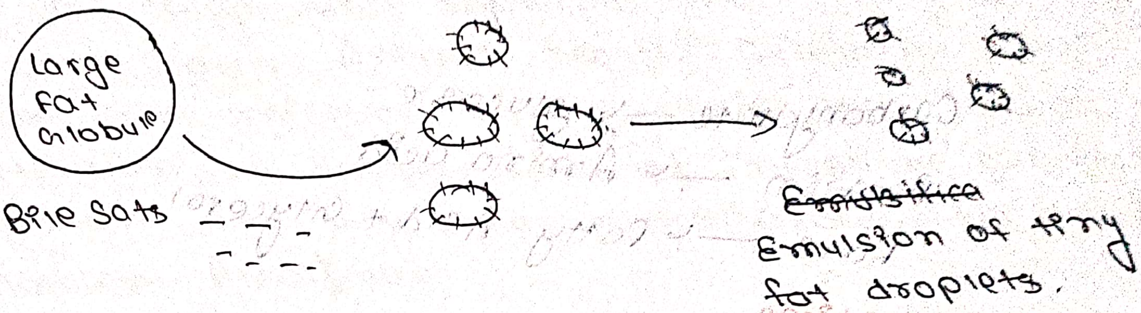
HCl
Makes the medium Acidic
- Inc. secretion of HCl cause acidity
- It can be neutralised by a base.

Pepsin
Enzymes that breaks down proteins

Mucus
Protects inner lining of the stomach

Liver

- It secretes Bile juice
- Bile juice is stored in the gall bladder.
- Bile juice makes food Alkaline → Basic
- Bile juice helps in emulsification of fats.
- It is responsible for the breakdown of large fat globules into small soluble fat globules.



Pancreas → Pancreatic Juice

- The pancreas produces juices that help breakdown food.
- It sends out enzymes like trypsing, Lipase & Amylase for digestion.
  - Trypsin for Proteins: This enzyme helps digest proteins.
  - Lipase for fats: This enzyme breaks down fats that have been emulsified
  - Amylase for Carbs: This enzyme helps digests carbohydrates,
- It also produces a hormone called insulin to control blood sugar.

Small Intestine

- The small intestine is the longest part of the alimentary canal, about $\underbrace{\text{20 feet}}_{\hookrightarrow (5-7)\text{m}}$ long in humans.
- It is the site of final Digestion.
- It secretes intestinal juice.

Absorption of food in Small Intestine.

- Villi are finger like projections.
- Increases the surface area for absorption
- Richly supplied with blood vessels which take the absorbed food to each and every cell of the body.
- Food is utilized for obtaining energy, building up new

tissues and the repair of old tissues.

Question.

The finger like projection in small intestine called villi. What is the main function of villi?

Carbohydrate → glucose
Protein → Amino acid
fats → fatty Acid + Glycerol.

Large Intestine.

- The large intestine in humans is about 5 feet long.
- It has two regions, the colon (about 1.5m) and the rectum (10cm in length in the adult).
- It many useful bacteria required for the digestion of food.
- All the unabsorbed food is sent into the large intestine.
- Absorption of water takes place in large intestine.

Anus

- Rectum opens to the outside by the anus.
- The anus has internal & external anal sphincters.
- Removal of undigested & unabsorbed food takes place here.

Appendix

- The appendix ~~of~~ is a small, tube-like structure attached to the beginning of the large intestine (specifically the caecum).

Function

Bacteria for good digestion.

The appendix is considered a vestigal organ, which means it doesn't have a significant function in digestion in humans.

Q why do herbivores have longer small intestine than the carnivores.

Herbivores have longer small intestine that the carnivores because the herbivores consume plant products that are more complex and difficult to digest than animal products. Their Diet contains cellulose that is a tough fibre molecule that is not easily broken down. Animals require symbiotic relation ~~bero~~ with microbes and bacteria that lead to need for extension of surface Area of intestine for fermentation and any other extra process to maximize nutrient Absorption

Q Salivary Amylase helps in breaking down.

A. Proteins

B. fats

C. Vitamins

~~D. Starch~~

Q which enzyme is present in saliva & helps in Digestion?

A. Trypsin

~~B. Pepsin~~

~~C.~~ Amylase

D. Lipase

Q what causes the movement of food inside the alimentary canal in human beings?

A. Digestion

B. Breaking

~~C. Peristalsis~~

D. Excretion

Q what is the function of Hydrochloric Acid in the stoma

a. Absorption of food.

b. Digestion of fat.

~~c. Kill~~ bacteria and provide acidic medium

d. formation of Bile

Q which of the following is correct regarding bile juice

A. Secreted by liver

B. Helps in emulsification of fats.

C. Makes food Alkaline for the action of lipase

D. All of the Above

Q In Human beings, when the process of Digestion is completed, the (i) Proteins, (ii) carbohydrates and fats are respectively finally converted into.
Amino acids, glucose & fatty acids & glycerol.

Q Which part of the Digestive system is responsible for complete digestion & absorption of Nutrients?

A. Stomach
B. large intestine
C. Small intestine
D. Oesophagus.

Q Assertion (A): The inner walls of the small intestine have finger-like projections called villi, which are rich in blood.
Reason (R): These ~~of~~ villi have a large surface area to help the small intestine in completing the Digestion of food.
Both A and R are true and R is the correct explanation of A.

Q What is the role of saliva in the Digestion of food?

- Saliva contains the enzyme salivary amylase, which breaks down starch into sugar.
- It also moistens the food, making it easier to chew and swallow.

Q How does Paramecium obtain its food?
Paramecium uses cilia to sweep food into the oral groove, forming a food vacuole where digestion occurs.

Q List the role of each of the following in Digestive system:

HCl: creates Acidic medium for pepsin and kills microbes.
Trypsin: Digest proteins in the small intestine.
Muscular walls of stomach: churn & mix food with enzymes.
Salivary amylase: Breaks starch into sugar in the mouth.

Q What is the function of Digestive enzymes?

Digestive enzymes help in breaking down complex food substances into simpler forms.

eg - Amylase Breaks down starch into sugars.
Pepsin digests proteins into peptides.
Lipase breaks down fats into fatty acids & glycerol.

These simpler substances can then be easily absorbed by the body.

Q What is the Role of the Acid in our stomach?

The Hydrochloric Acid in our stomal creates an acidic medium, which helps pepsin enzyme work effectively to digest proteins.

Kills harmful bacteria that may enter the food.

Aids in breaking down food particles

Q Why is small intestine the most important organ for Digestion and Absorption of food?

- The small intestine is the longest part of the Digestive System where most of the digestion and absorption of food takes place.
- It receives digestive juices from the pancreas and liver (bile), which help in the Digestion of carbohydrates, proteins & fats.
- The inner wall of small intestine have many finger like projections called villi which increase the surface area for absorption.
- Nutrients from the Digested food are absorbed through these villi into the bloodstream, which transports them to different parts of the body.
- Thus, the small intestine is important because it completes digestion and efficiently absorbs nutrients.

Q Write the functions of the following organs in the human Digestive system ⓘ Liver, ⓘⓘ Pancreas, ⓘⓘⓘ Stomach.

i. Liver

- Produces bile juices which helps in the Digestion & emulsification of fats

- Also helps in Detoxifying harmful substances and Stores nutrients.

ii Pancreas

- Produces pancreatic juices containing enzymes like amylase, lipase and protease that help in the digestion of carbohydrates, fats & proteins respectively.
- Release these enzymes into small intestine.

iii Stomach

- Secretes gastric juice containing HCl and pepsin enzyme which helps in the Digestion of proteins.
- The acidic environment also kills bacteria present in food.
- The stomach also mixes food thoroughly and turns it into a semi-solid mass called chyme.

Q What will happen if the bile isn't secreted in the human body? Explain.

- Bile juice helps in the Digestion and Absorption of fats by breaking large fat droplets into smaller droplets (emulsification).
- If bile isn't secreted, fats will not be properly emulsified, and digestion of fats will be incomplete.
- This leads to poor absorption of ~~fats~~ and fat soluble vitamins (A, D, E & K).
- As a result, the person may suffer from nutritional defencies and digestive problems

Q What is peristalsis? How does it help in Digestion? In which organs does it occur?

- Peristalsis is the process of rhythmic wave like muscular contractions that occur in the walls of the alimentary canal.
- These contractions help to push the food forward through the digestive tract from the mouth to the anus.
- Peristalsis ensures the proper movement of food in one dir^n and helps in the mixing of food with digestive juices, aiding digestion.
- It occurs in the oesophagus, stomach, and intestines

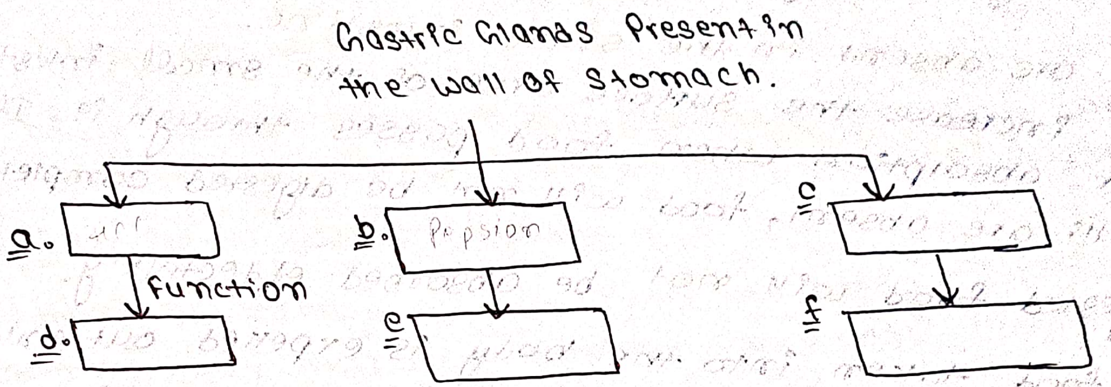
Q. What are villi? Mention their supposed function.

Villi are blood riched finger like projection present in the innerwall of small intestine.

Functions

It increase surface area of small intestine for maximization of absorption of digested food into the blood.

Complete the following flow chart as per the given instruction



Q. Case/Source Based Questions.

Human Digestive System is a tube running from mouth to anus. Its main function is to breakdown complex molecules present in the food which can't be absorbed as such into smaller molecules. These molecules are absorbed across the walls of the tube and absorbed food reaches each and every cell of the body where it is utilised for obtaining energy.

a. Name the glands in the buccal cavity and write the components of food on which the secretion of these glands act upon.

The glands present in the buccal cavity are the salivary glands. These glands secrete saliva which contains the enzyme amylase that acts on carbohydrates and convert them into simpler sugers.

b. 2 organs have a sphincter muscle at their exit. Name them.

Stomach and Anus. The sphincter muscle controls the passage of substances through the exit of these organs.

c. What will happen if:

i. mucus isn't secreted by the gastric gland.

- The inner lining of the stomach will be exposed

~~ir villi are present in the small intestine~~

to strong acids and digestive enzymes, leading to erosion and potential ulcers.

- Without mucus, the stomach may digest itself, as there will no protective barrier against HCl.
- The stomach lining will be damaged, disrupting the digestive process and causing Discomfort.
- Additionally, food mayn't ~~have~~ move easily through the Digestive system, further complicating digestion.

ii Villi are absent in the small intestine.

- Villi increase the surface area of the small intestine for absorption when food passes through it. If villi are absent, food will not be digested completely.
- Digested food will not be absorbed effectively.
- The food taken into the body is expelled out/only after completing partial absorption in the small intestine.
- The body will suffer from starvation of nutrients

Breathing

Breathing is the process of exchanging gases — mainly oxygen and carbon dioxide — between our body and the environment.

Steps of Breathing.

1. Inhalation → Taking air into the body.
2. Exhalation → Releasing air out of the body.

Why do we Brethe?

Our body needs oxygen to produce energy. When our cells make energy, they also produce carbon dioxide as a waste product.

- Breathing in brings oxygen into the body.
- Breathing out removes carbon dioxide.

This exchange helps keeps our body working effic

Respiration

Glucose + Oxygen → Energy (ATP) + CO_2 + H_2O

Glucose ↓ from our food

Energy (ATP) ↓ can be used for cell activity.

It is the process by which food glucose is oxidiz in cells to release energy.

Oxygen is taken from the environment to help in the complete breakdown of food.

chemical eqⁿ.

Glucose $(C_6H_2O_6)$ → Pyruvate → $6CO_2$ + H_2O + Energy (38 ATP).

Types of Respiration

- Aerobic Respiration
- Anaerobic Respiration

Aerobic Respiration

A process in which glucose is broken down in the presence of oxygen to release energy (ATP), along with carbon Dioxide and water.

Key features

- Requires oxygen.
- Produces a large amount of energy.

example

When we run, our cells use aerobic respiration to get energy from food.

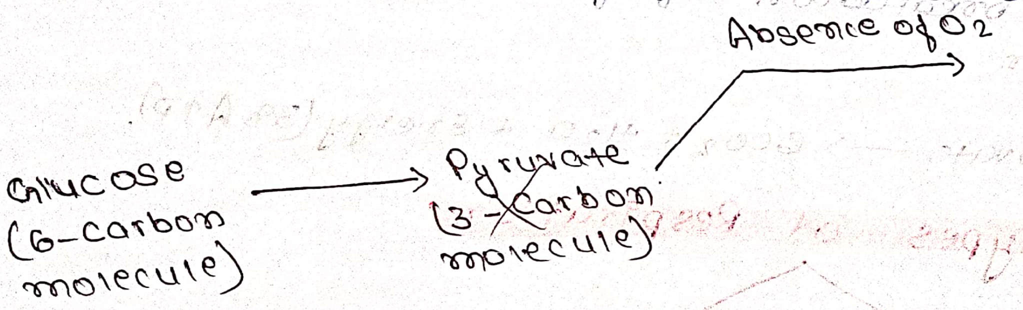
Anaerobic Respiration

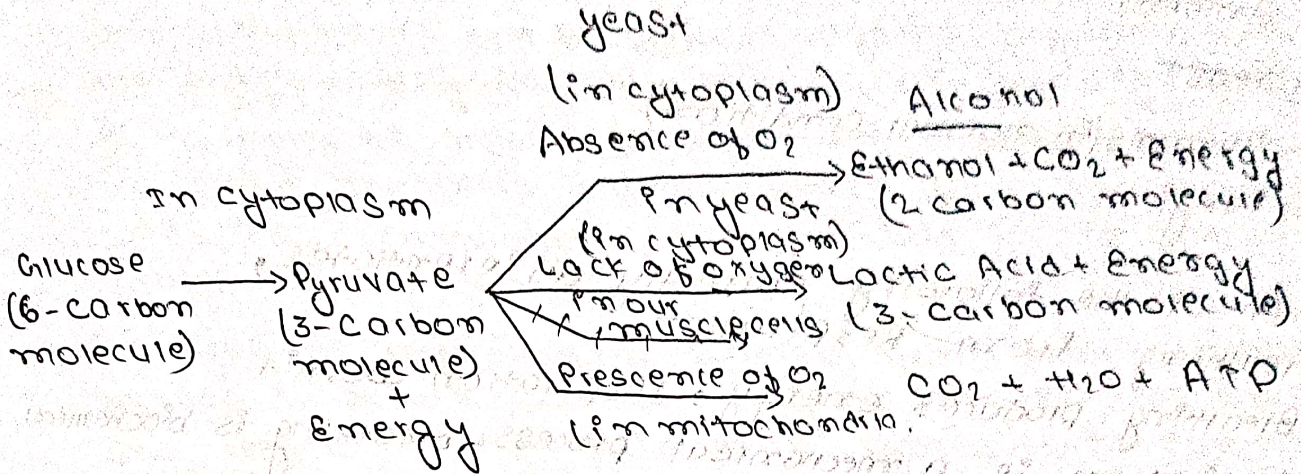
The process of Breaking Down glucose without oxygen to release a small amount of energy (A.T.P).

Key features.

- Occurs in absence of oxygen.
- Releases less energy than aerobic respiration.
- Happens in yeast, some bacteria, and muscle cells (during heavy exercise).
- Products by-products like lactic acid or ethanol + CO_2

Aerobic	Anaerobic
Presence O_2	×
more energy	less energy
By-product →	By Product →
$H_2O + CO_2$	Ethanol + Lactic + CO_2




yeast
(in cytoplasm)
Absence of O_2
Alcohol
Ethanol + CO_2 + Energy
(2 carbon molecule)
In cytoplasm
Glucose
(6-carbon molecule)
Pyruvate
(3-carbon molecule)
+
Energy
in yeast
(in cytoplasm)
Lack of oxygen
Lactic Acid + Energy
(3-carbon molecule)
in our muscle cells
Prescence of O_2
(in mitochondria.
CO_2 + H_2O + ATP

Types of Anaerobic Respiration

1. Alcoholic fermentation.

It is the process of incomplete breakdown of sugar (glucose) into ethanol, CO_2 to release energy. This process occurs mainly in yeast which is used to produce beer, urine e.t.c.

Glucose → Pyruvate + Energy → Ethanol + CO_2 + 2 A.T.P

2. Lactic fermentation

It is the process of incomplete breakdown of sugar into lactic acid + energy in some bacteria and in our muscle cells

During intense exercise, muscles rapidly convert glucose to lactic acid for quick energy, using up stored A.T.P. This lactic acid buildup causes fatigue and cramps.

Questions

Q1 What is the final products of anaerobic respiration in human muscles?

A. Carbon dioxide
B. Ethanol
[✓ C. Lactic Acid]
d. Water.

Q Which of the following organisms performs anaerobic respiration?

a. Amoeba

b. Yeast

c. Humans (in normal condition)

d. fungi

Q Which of the following correctly differentiates breathing from Respiration.

A. Breathing produces energy, respiration doesn't

B. Respiration is a mechanical process, breathing is biochemical

C. Breathing involves lungs, respiration occurs in cells.

d. Breathing involves enzymes, respiration doesn't.

Q Differentiate betw Aerobic and Anaerobic respiration. Give one example of each.

Aerobic Respiration	Anaerobic Respiration
Occurs in the presence of oxygen.	Occurs in the absence of oxygen.
Glucose is completely broken down.	Glucose is partially broken down.
End products are Carbon Dioxide & water.	End products are ethanol, carbon dioxide (in yeast) or lactic acid (in muscles).
More energy is released.	less energy is released.
Occurs in the mitochondria.	occurs in cytoplasm.
eg - Respiration in humans.	eg - Respiration in yeast or muscle cells.

Q Sometimes sports man while running, the ~~[illegible]~~ athletes suffer from muscle cramps. why? How is the respiration in this case is Different from aerobic respiration.

When sportspersons run or perform vigorous physical activities, the oxygen supply to their muscle cells becomes insufficient. As a result, the muscle cells perform anaerobic respiration, in which glucose is partially broken down into lactic acid. The accumulation of lactic acid in the muscles causes muscle cramps.

This type of respiration is Different from aerobic respiration because it occurs without oxygen, produces less energy, and results in lactic acid as a byproduct. In contrast, aerobic respiration takes place in the presence of oxygen, produces more energy, and forms carbon dioxide and water.

Q The sequence of anaerobic respiration in our muscle cells during heavy exercise is,

a. Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate $\xrightarrow{\text{Mitochondria}}$ Ethanol + CO_2

b. Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate $\xrightarrow{\text{Cytoplasm}}$ Lactic Acid

c. Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Lactic Acid

d. Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate $\xrightarrow{\text{Cytoplasm}}$ Ethanol + carbon dioxide

Exchange of Gases in Plants.

Respiration in plants is simpler than the respiration in animals.

Gaseous exchange occur through:

a. Stomata in leaves
b. Lenticles in stems
c. General surface of Roots.

Daytime

O_2 $\nwarrow$ $\nearrow CO_2$

Photosynthesis + Respiration

CO_2 is taken in for photosynthesis

O_2 is released as a byproduct of photosynthesis.

oxygen released, CO_2 absorbed

Nighttime

$\nearrow CO_2$

only Respiration

CO_2 is released as a byproduct of Respiration.

O_2 is used in respiration

Carbon dioxide released
O_2 absorbed.

Q What happens at night in plants regarding gas exchange?
Photosynthes stops (no light), so respiration continues. CO$_2$ is released, and O$_2$ is consumed

Q In plants, exchange of gases mainly takes place through.

A. Root hairs and Xylem

B. Phloem and Guard cells.

~~C. Sto~~mata and lenticels

D. Chloroplasts and Mitochondria

Q All living cells require energy for various activities. This energy is available by the breakdown of simple carbohydrates either using oxygen or without using oxygen.

The graph below represents the blood lactic concentration of an athlete during a race of 400m & shows a peak at point D.

Lactic Acid production has occured in the athlete while running in the 400m race.

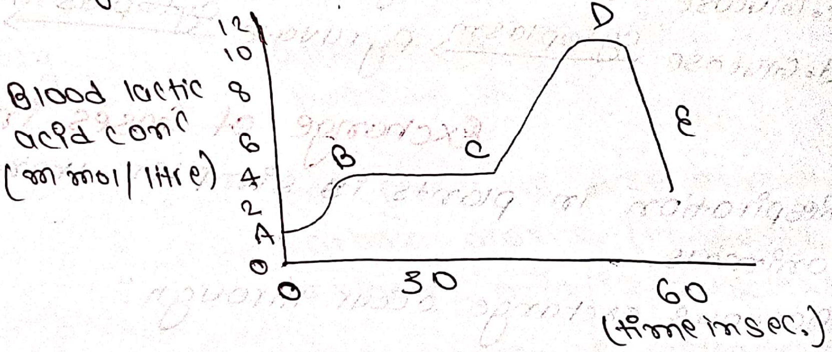
i. Which of the following processes explains this event?

A. Aerobic respiration

~~B. A~~naerobic respiratio

C. Fermentation

d. Breathing



ii Lactic Acid production during the race indicates:

a. Aerobic Respiration

~~b. An~~aerobic respiration

c. Fermentation

d. Breathing

iii Characteristics of Anaerobic respiration include.

a. Presence of oxygen

b. Release of CO$_2$

c. Release of energy

d. ~~Release~~ of lactic acid

How do Fishes Breathe under water?

- Fishes use gills as their respiratory organs.
- Gills are located on the sides of the head and are richly supplied with blood capillaries.
- When a fish opens its mouth, water enters and passes over the gills.
- The gills absorbed oxygen dissolved in water and transfer it into the blood through diffusion in the capillaries. At the same time, carbon Dioxide from the blood diffuses out into the water and is removed.
- The gills are covered by a bony flap called the operculum, whi protects the delicate gill filaments and also helps maintain a steady flow of water over them even when the fish isn't swimming.
- In fishes, the blood passes only through the gills, not through the rest of the body during the process of oxygenation. This is Different from double circulation seen in humans. The oxygenated blood is then circulated to the rest of the body.
- This system allows fishes to breathe and survive underw even though there is no free oxygen gas like in the air.

Q What Advantages over an aquatic organism does a terrestrial organism have with regard to obtaining oxygen for respiration?

Oxygen is more abundant in the air than in water.

Terrestrial organisms get oxygen more easily due to better respiratory surfaces (lungs, skin e.t.c)

Q As compared to terrestrial organisms, the rate of breathing in aquatic organisms is.

Faster because the amount of Dissolved oxygen in water is fairly low.

Q The rate of breathing in aquatic orgms is much slower than that seen in terrestrial orgm. —> Assertion.

Reason(R): The amount of oxygen Dissolved in water is very low as compared to the amount of oxygen in air.

Assertion is false but Reason is true.

Q Ravi is a 16-yr old ~~atheltet~~ athlete preparing for his ski sports competition. During practice, he notices that his breathing rate increases significantly while running, and sometimes he feels mild cramps in his legs. His coach explains that the body requires more energy during intense activity, and oxygen supply mayn't meet the Demand.

Questions.

1. Why does Ravi's breathing rate increase during exercise?
2. Name the type of Respiration that occurs in muscles during intense physical activity.
3. What causes cramps in muscles after heavy exercise?
4. Write the word eqn for anaerobic respiration in human muscles.
5. Suggest one way to reduce muscle cramps.

Q ⓐ Rate of Breathing in aquatic orgm is much faster than that in terrestrial orgm. Give reasons.

ⓑ complete the following pathway showing the breakdown of glucose.

ⓐ Because the amount of oxygen Dissolved in water is very low as compared to the amount of oxygen in air.

ⓑ Glucose (6-carbon molecules) $\xrightarrow{\text{in cytoplasm}}$ (i) $\overset{?}{\overline{\text{3-carbon molecules + energy}}}$ $\xrightarrow[\text{in mitochondria}]{\text{Presence of } O_2}$

(ii) $\xrightarrow{\hspace{2cm}}$ + H_2O + Energy

$$\underset{\text{(6-Carbon molecule)}}{\text{Glucose}} \xrightarrow{\text{in cytoplasm}} \underset{\text{(3-Carbon molecules + energy)}}{\text{Pyruvate}} \xrightarrow[\text{in mitochondria}]{\text{Presence of oxygen}} CO_2 + H_2O + \text{Energy}$$

Human Respiratory System

Human Respiratory system is the biological system responsible for taking in oxygen and removing carbon dioxide from the body. It helps us breathe, and it's essential for cellular respiration, which produces the energy our body needs to function.

Exchange of Gases~~ous~~ in Human Body.

Oxygen-rich air from environment ——→ Nasal cavities ——→ Pharynx ——→ Trachea ——→ Bronchi ——→ Bronchioles ——→ Alveoli ——→ oxygen and carbon dioxide exchange at Alveoli ——→ Bronchioles ——→ Bronchi ——→ Trachea ——→ Pharynx ——→ Nasal cavities ——→ Carbon dioxide Rich air to the environment

Passage of Air through Respiratory System.

Nostril: Air ~~pas~~ enters the body through the nostrils.

Nasal Passage: Serves as a pathway for air to move through the nose

Nasal cavity: Contains hair and a mucous lining. It filters, humidifies, and warms the air before it travels to the lungs.

Pharynx: composed of cartilaginous rings that keep the airway open and prevent collapse.

Larynx: contains vocal cords and helps control voice pitch and volume, aiding speech. commonly reffered to as the voice box.

Trachea: A continuation of the pharynx that divides into the bronchi and links the voice box to the lungs, enabling air movement in and out.

Bronchi: Major airways into the lungs that branch from the trachea. They transport air in and out and are invoved in gas exchange.

Bronchioles: Smaller branches of bronchi leading deeper into lung tissue. They direct air from the mouth/nose to the alveoli.

Alveoli: Tiny tube ending that expand into ballon - like sacs. facilicate the exchange of oxygen and carbon dioxide between the lungs and blood

Q What is the function of rings of cartilage in the trachea?

a. Help in Respiration

b. Prevent collapsing of trachea.

c. Protect the lungs.

d. Help in Digestion.

Questions

Q What is the function of mucus in the nasal passage?

a. Absorbs oxygen

b. Moves the air in and out.

c. Filters dust and germs

d. Moistens the lungs.

Alveolus Gas Exchange

The blood brings CO_2 from the rest of the body for release into the alveoli, and the oxygen in the alveolar air is taken up by blood in the vessels to be transported to all the cells in the body.

Red Blood cells

- Haemoglobin inside RBCs binds with oxygen O_2.
- It traps O_2 in the lungs.
- RBCs then transport oxygen to all parts of the body.
- After delivering oxygen, they carry carbon dioxide back to the lungs for exhalation.

Fact: The biconcave shape of RBCs increases surface area for efficient gas exchange.

Haemoglobin

- A respiratory pigment.
- Iron containing protein
- Gives red color to RBC

Affinity of Haemoglobin for various gases:

$CO > O_2 > CO_2$.

Q Name the respiratory pigment in human beings. What is the role?

The Respiratory pigment in human beings is haemoglobin.

Role

Haemoglobin is present in RBCs and helps in the transport of oxygen. It binds with oxygen in the lungs to form oxyhaemoglobin and carries it through the blood to various body tissues. It also helps in the transport of a small amount of Carbon Dioxide from tissues back to the lungs.

V.I
How are the alveoli designed to maximise the exchange of gases?

Thin walls (one cells thick)
Large Surface Area
Surrounded by capillaries
Moist inner surface for gas diffusion

Diaphragm

A skeletal muscle that seperates the chest from the abdomen and helps in breathing.

- During the process of breathing in, the diaphragm contracts and moves downwards, while the ribs move upwards and outwards. This movement increases the volume of the chest cavity and reduces the pressure inside, causing air to be sucked into the lungs.

- During breathing out, the ~~diag~~ diaphragm relaxes and moves upwards, and the ribs move downwards and inwards, reducing the volume of the chest cavity and increasing the pressure, which pushes air out the lungs.

Q what role does Diaphragm play in breathing?

Or

Q State the changes that occur in the Diaphragm during inhalation.

The Diaphragm is a dome-shaped muscular sheet that seperates the chest cavity from the abdominal cavity.

- During inhalation, the Diaphragm contracts and moves downward, increasing the volm of the chest cavity.
- This reduces the pressure inside the lungs, causing air to rush in.

Inhalation	Exhalation.
Diaphragm flattens	Diaphragm arches upwar
Ribcage moves upwards and outwards.	Ribcage moves downwar and inwards.
Volm of thoracic cavity increases while air pressure decreases.	Volm of thoracic cavity decreases while air pressure increases.
Air flow into lungs.	Air forced out of the lungs.

Residual Volume

Residual Volume (RV) is the air that remains in the lungs even after forceful exhalation

Case Based Question

A human respiratory system consists of organs such as the nasal cavity, trachea, bronchi, lungs and diaphragm. When we inhale, air passes through the nostrils, filtered by tiny hairs and mucus, and travels down the trachea into the lungs. The lungs contain alveoli, where the & exchange of gases occurs. oxygen diffuses into the blood, and carbon dioxide is expelled during exhalation. The Diaphragm plays a crucial role by contracting and relaxing during breathing.

(i) What is the main function of Alveoli in the lungs

A. filter incoming air.
[✓ B. Exchange gases betw lungs & blood.]
C. Pump blood through the body
D. Produce digestive enzymes.

(ii) Which structure ~~keeps~~ prevents the trachea from collapsing?

a. Diaphragm
b. Ribs
[✓ c. Cartilaginous rings]
d. Bronchioles.

(iii) During inhalation, the Diaphragm

a. Relaxes & moves upward.
[✓ b. Contracts & flattens]
c. Contracts & becomes dome-shaped
d. Becomes inactive.

iv. Air is rich in ______ when it enters the lungs

a. CO_2
[✓ b. O_2]
c. N
d. water vapour)

Human Circulatory System

Transportation

Transportation is a vital biological process that enables the movement of essential substances like oxygen, nutrients, salts, carbon dioxide and waste materials throughout a multicellular organism. This ensures all parts of the body receive what they need to function properly.

Blood

Blood is a red-coloured connective fluid that flows throughout the body.

It plays a major role in transporting substances and provides protection through immune response

- Universal Donor : O-negative
- Universal Acceptor : AB-positive

In short: O^- saves all. AB^+ takes it all.

Function of Blood

→ Plasma
→ cells

Transport Function

- Carries digested nutrients to body cells.
- Transports waste products to excretory organs.(eg- Urea to kidneys, CO_2 to lungs).
- Distributes hormones from glands to target organs.
- Helps regulate body temperature by transporting heat.
- Transports oxygen from lungs to other parts o the body.
- Plasma carries most substances except oxygen
- RBCs carry oxygen.

Protective Function

- WBCs defend the body by destroying harmful pathogens & providing immunity.

- Platelets help in clotting blood, preventing excessive loss during injuries

Blood Plasma.

Water -> 90%.
Proteins -> 7 - 9%.
Sugar -> 0.1%.
Urea -> 0.03%.
Salts -> 0.9%.

- The fluid component of blood; pale yellow in color.
- Composed mostly of water (~90%), with proteins, salts, urea, and other dissolved substances.
- Main medium for transporting nutrients, hormones and waste materials.

Injury ⟶ Loss of Blood

↓

Pressure of Blood will be affected

↓

Efficiency of transportation of substances will be decreased.

Platelets.

Small, disc-shaped cell fragments.
Responsible for clot formation at injury sites.
Release substances that help form a clot & seal wounds

Blood Vessels.

- Arteries carry oxygen-rich blood away from the heart.
- Veins return oxygen-poor blood back to the heart.
- Capillaries are tiny vessels where exchange of gases, nutrients, and wastes occurs betw blood and tissues.

	Arteries	veins	Capillaries
Dir^n of blood.	Away from the heart.	Towards the heart	Link arteries & veins.
oxygen	oxygenated blood	Deoxygenated Blood	Both
Pressure	High	low	Medium
walls	Thick & elastic	Thin	Extremely thin
valves	Absent	Present	Absent

what is the main function of the circulatory system in humans?

A. Digestion of food.

[✓ B. Transportation of oxygen & nutrients.]

C. Excretion of waste.

D. control of body movements.

Q veins have valves to

[✓ A. Prevents back flow of blood]

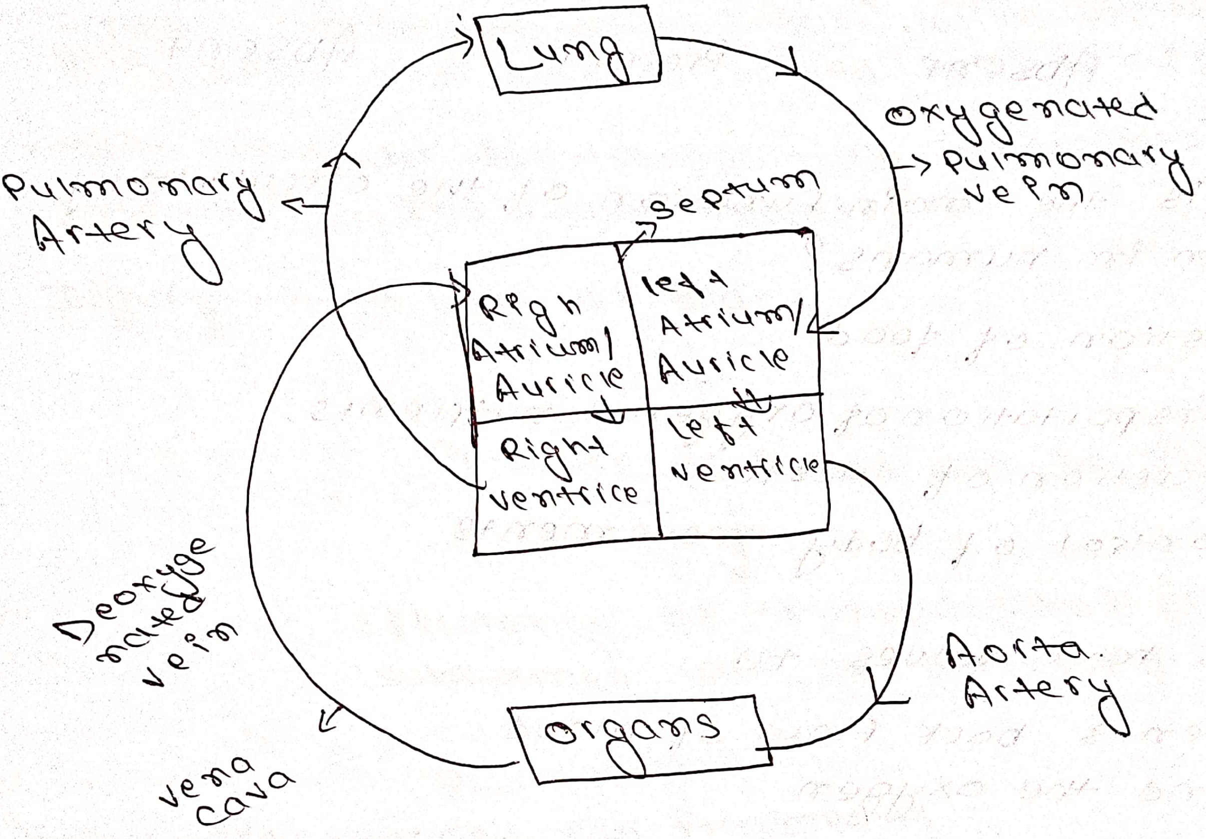
B. Bind the oxygen

C. Maintain its position in the body

D. All of the Above

The Heart

- The heart is a muscular organ responsible for pumping blood throughout the body.
- It is situated in the chest cavity, slightly titled to the left, near the left lung.
- About the size of a clenched fist.
- It ensures continuous circulation of Blood, ~~delivering~~ delivering oxygen & nutrients ~~and~~ removing waste.


Lung
Pulmonary Artery
oxygenated Pulmonary vein
septum
Righ Atrium/ Auricle
left Atrium/ Auricle
Right ventrice
left ventricle
Deoxygenated vein
Aorta Artery
vena cava
organs

lungs → P.V → Aorta → vena cava → P.A.

Atrium/Auricle	Ventricle
The upper chambers of the Heart.	The lower chambers of the heart.
They receive blood coming into the heart.	They pump blood out of the heart.
Thinner walls.	Thicker walls.
Right atrium receives deoxygenated blood from the body, left atrium receives oxygenated blood from the lungs.	Right ventricle pumps deoxyenated blood to the lungs, left ventricle pumps oxygenated blood to the rest of the body.

Working of Human Heart.

- The Heart has 4 chambers: two upper atria and two lower ventricles.
- Right atrium receives deoxygenated blood from the body through the venacava.
- Blood moves to the right ventricle, which pumps it to the lungs via the pulmonary artery.
- In the lungs, blood gets oxygenated.
- left atrium receives oxygenated blood from the lungs via pulmonary veins.
- Blood then moves into the left ventricle, which pumps it to the rest of the body through the aorta.
- Valves betw chambers prevent backflow and ensure one-way flow of Blood.
- This rhythmic contraction and relaxation is called the cardiac cycle.

Body (Deoxygenated Blood)
↓
Right Atrium
↓
Right ventricle
↓
Pulmonary Artery
↓
lungs (Blood gets oxygenated)
↓
Pulmonary vein
↓
left Atrium
↓
left ventricle
↓
Aorta
↓
Body oxygenated Blood.

Q What is Double circulation? why is it necessary in humans? Name the animal group with this feature.

Double circulation is a type of blood circulation in which the blood passes through the heart twice in one complete cycle of the body.

Pulmonary Circulation: Blood moves from heart to the lungs and back to the heart.

Systematic Circulation: Blood moves from the heart to the rest of the body and returns to the heart.

Necessity in humans

- It ensures complete separation of oxygenated and deoxygenated blood, which is essential for efficient oxygen supply to body tissues.
- It maintains high blood pressure in the organs for proper functioning.
- It supports the high energy needs of warm-blooded animals like humans.
- Birds & Mammals (including humans) show double circulation.

Why we need Chambers in Heart?

- Chambers prevent the mixing of oxygen-rich (oxygenated) & oxygen-poor (deoxygenated) blood.
- Ensures that more oxygen is efficiently delievered to body tissues.
- Enhances oxygen supply leading to better respiration & higher energy production.
- Allows separation of blood flow for lungs & rest of the body, aiding double circulation.

Vertebrate's

Class	Chamber in Heart	Type of circulation	temp maintain
Pisces	2	Single Circulation	No (cold blood)
Amphibians	3	Double circulation (Incomplete)	No

Pisces	2	Single circulation	No(cold blooded)
Amphibians	3	Double circulation (Incomplete	No (cold blooded)
Reptiles	3	Double circulation (Incomplete)	No (cold blooded
Aves	4	Double circulation (complete)	yes (warm blooded)
Mammals	4	Double circulation (complete	yes (warm blooded

Warm Blooded.

Warm Blooded can regulate and maintain a nearly constant internal body temperature.

- Higher energy needs, more efficient circulatory system

eg- Birds, Mammals.

Cold Blooded

Body temperature varies with the environment.

- Lower energy needs, less efficient circulatory System.

eg- fishes, Amphibians, Reptiles.

Q which chamber of the heart recieives deoxygenated blood from the Body?

Right Atrium

Q The blood vessel that brings oxygen-rich blood from the lungs into the heart is.

Pulmonary vein.

Q. In Double circulation, which organs are involved.?
Heart & lungs

Q. A person's left ventricle isn't functioning efficiently. which of the following symptoms is most likely to be observed.

A. Poor oxygenation of Blood in the lungs.
B. Accumulation of Blood - deoxygenated in the right atrium.
C. Reduced Blood flow to the body tissues
D. Excess blood supply to the brain.

Q. Differentiate betw single & double circulation. Give an example of each.

~~Basis of~~

	Single Circulation	Double Circulation.
No. of times blood passes through the heart in one cycle.	Once	Twice
Oxygenated & Deoxygenated blood.	Blood is not completely seperated	Blood is completely seperated.
Efficiency	less efficient in oxygen supply.	More efficient in oxygen supply.
Example	fish	Humans (also birds & mammals)

Lymphatic System.

Consists of
Lymph fluid: A clear fluid Derived from blood Plasma.
Lymph vessels : Transport lymph throughout the body.
Lymph Nodes : filter lymph & house immune cells.

- Works parallel to circulatory system & supports immunity & fluid balance.

Lymph

Lymph is defined as clear, colourless fluid that circulates throughout the circulatory lymphatic system. It is similar to blood plasma, but without RBCs.

- Lymph is derived from the fluid that leaks out of blood capillaries into the spaces betw cells (interstitial fluid).

V.I Function of lymphatic Systems.

- Absorbs fat and fat soluble vitamins from the digestive tract and returns them to blood circulation.
- Drains excess fluid from the body tissues to maintain fluid balance.
- Acts as part of the immune system by producing and transporting lymphocytes and antibodies.
- Helps defend against infections by filtering pathogens through lymph nodes.

	Blood	Lymph
Colour	Red in colour due to presence of red blood corpuscles (RBCs)	Colourless because it lacks RBCs and has less protein content.
Components	Contains plasma, RBC, WBC, platelets & dissolved substances.	Similar to plasma, contains plasma, proteins, & lymphocytes (a type of WBC) but no RBCs.
Functions	Transports oxygen, CO_2 food waste, hormones e.t.c throughout the body.	Drains excess tissue fluid (tissue fluid = Plasma + some blood cells) back to the blood transports fat from intestine, and helps in immune responses.

Circulation

circulates through a closed system of arteries, veins and capillaries	flows in lymphatic vessels which are separate from blood vessels

Q Function of lymph is to.

A. Help in Respiration

B. Transport hormones

C. Transport oxygen

[✓ D. Return leaked fluid from tissues to blood]

Q What will happen if lymphatic vessels get blocked?

If lymphatic vessels get blocked, lymph can't drain properly from the tissues. ~~le~~

- Swelling in the affected body parts (usually arms or legs)
- Accumulation of tissue fluid
- Increased Risk of infections
- Impaired waste Removal from tissues,

In severe cases, it can lead to chronic pain and restricted movement.

Q What is lymph? Write two differences betw blood and lymph.

lymph is a clear, yellowish fluid that circulates in the lymphatic vessels. It helps in transporting nutrients, oxygen, and WBC and also plays a key role in immunity and draining excess fluid from tissues

Blood	Lymph
Red due to presence of haemoglobin.	Pale yellow and transparent.
Contains RBCs, WBCs, Platelets & Plasma	Contains WBCs, Plasma but no RBCs or Platelets.

Transportation in Plants.

Transportation is the process by which plants move essential materials like oxygen, food, salts, carbon dioxide and waste between different parts of their body to stay alive and function properly.

What gets transporated

- Oxygen
- Carbon Dioxide
- water
- food (Glucose, Sucrose)
- Minerals (like Nitrogen, Phosphorus)
- Hormones
- wastes

Short Distance Transportation.

When the Distance between two plant cells is small, water and nutrients can move easily through Diffusion and osmosis.

Diffusion & osmosis

Diffusion : Movement of Particles from high to low concentration, no membrane needed.

Osmosis : Movement of Solvent (usually water) from low to high solute concentration through a semi-permeable membrane.

why is Transport slow?

- Plants stay stationary
- Many cells in plant tissues are dead.
- So, Plants require less energy, and there's no hurry to move materials quickly.

Xylem

Xylem moves water and minerals obtained from the soil.

Elements of xylem

- Vessels – Tube-like dead cells for water conduction.
- Tracheids – Narrow tubes aiding water flow.

Xylem fibres- Provide support.
Xylem Parenchyma - Stores food.

- Dead Tissue - Living Tissue

Transport via Xylem - Ascent of Sap

Ascent of sap is the upward movement of water and minerals from roots to the top of the plant through xylem defying gravity.

Transpiration/Suction Pull

Transpiration is the process by which plants lose water in the form of water vapour from the aerial parts, especially through tiny openings called stomata on the leaves.

- Water loss through leaves creates a vaccum - like pulling force in Xylem
- This pulling force is known as transpiration pull/suction pull.
- This pull draws water from the roots to the top of the plant.

Function of transpiration.

- Helps absorb and move water/minerals from the soil to the leaves.
- Regulates plant temperature
- Aids in removing excess water.

Phloem

- Phloem transports products of photosynthesis (like sugars) from the leaves to other parts of the plant.

Elements of Phloem
Sieve Tubes- Conduct food
Companion Cells- Help sieve tubes
Phloem fibres- Give support
Phloem Parenchyma - Stores food
- Dead Tissue - Living Tissue

Transport via Phloem — Translocation

Food made in the leaves is transported to other parts of the plant through the phloem by the process of translocation, which involves active loading of sugars, creation of pressure, and movement of food solution to where it is needed in plant.

Feature	Xylem	Phloem
Function	Transport water & Minerals.	Transports food (prepared in
Dir^n of flow	Unidirectional (only upward)	Bidirectional (both upward & downward).
Components	Tracheids, vessels, xylem Parenchyma, fibers.	Sieve tubes, companion cells, Phloem Parenchyma, fibers
Living/Dead	Mostly Dead cells (except xylem Parenchyma)	Mostly living cells (except Phloem fibres).
Role	Helps in water conduction & mechanical support.	Helps in transport of food.

Questions

Q1. Water is transported in plants through
A. Phloem [✓ B. Xylem] C. Stomata D. Cortex

Q2 The Process of losing water in the form of vapour from aerial parts of plants is.
A. Translocation
B. Respiration
[✓ C. Transpiration]
D. Transportation.

Q3 Which process helps in the upward movement of water in tall trees?
A. Root Pressure [✓ C. Transpirational Pull]
B. Gravitation Pull D. Osmosis

Q4 Xylem is responsible for transporting.
a. food [✓ b. Water & minerals] c. Hormones d. Proteins

Q5 How are water and minerals transported in plants?

Water and minerals are transported in plants through a special tissue called xylem.

I. Absorption by Roots:

- The roots of the plant absorb water and minerals from the soil through root hairs by the process of osmosis (for water) and active transport (for minerals).

II Movement through Xylem:

The absorbed water & minerals are transported upwards from roots to stems and leaves through the xylem vessels and tracheids.

III Mechanism of Transport — Transpiration Pull:

The upward movement of water is mainly driven by transpiration, which is the loss of water as water as water vapour from the stomata of leaves. This creates a suction force or transpiration pull that helps pull water upwards through the plant.

IV Other forces Helping Transport.

- Root Pressure (due to osmotic pressure in Roots) also helps push water upwards.
- Capillary action (narrow xylem tubes) helps water to rise.

Q6 What is translocation?

Translocation generally refers to the movement of a substance or material from one location to another. In biology, it commonly describes the transport of nutrients and other molecules within organisms, particularly in plants. In genetics it can refer to a change in chromosome structure where a segment of one chromosome breaks off and attaches to another.

What is Excretion?

Excretion is the essential biological process that helps eliminate harmful waste products formed during metabolism from the body

Metabolic wastes.

Key waste products expelled through excretion include

- Carbon Dioxide
- Surplus water/Extra water.
- Excess salts
- Nitrogen-Based Salts.

Diagram of Human Excretory System

Kidney

Kidneys, the bean-shaped organs located on either side of the spine, are vital for filtering ~~boo~~ blood, removing waste, and balancing body fluids.

Function of Kidneys.

- Waste-rich Blood enters through Renal Artery
- Clean blood exists via the renal vein.
- The ureter transports extra water and toxins as urine to the bladder.

Why & How is urine produced?

Urine is produced to remove harmful metabolic waste, mainly through the filtration of blood in the kidneys.

Nephron - fundamental unit of kidney

Nephrons are tiny filtration units inside the kidneys.

Each kidney contains around a million nephrons that work to filter blood and form urine.

Steps in the formation of Urine in Humans.

Step 1 - Glomerular Filtration

Blood pressure pushes nitrogenous waste, glucose, water and salts from blood into Bowman's capsule to form initial filtrate.

Step 2 - Selective Reabsorption

Useful substances like glucose, amino acids, salts and most water are reabsorbed back into the blood via surrounding capillaries.

Step 3 - Tubular Secretion

Urea, Extra water and salts are added to the tubule and eventually pass into the collecting duct and then the ureter as urine.

Urinary Bladder.

- The Urinary Bladder serves as a temporary storage unit for urine.
- It is a muscular organ, functioning under the command of the nervous system.

Micturition

Micturition refers to the act of eliminating urine from the body.

Q1 The basic unit of excretion in the human kidney is.
A. Neuron B. Alveolus C. Nephron D. Glomerulus.

Q2 Excretory product in humans is.
A. Urea B. Ammonia C. Uric Acid D. Glucose

Q3 Kidneys help in
A. Digestion B. Blood Purification C. Transportation D. Respi

Q4 Urine formation involves
A. Filtration, Reabsorption, Secretion
B. Diffusion only
C. Translocation
D. Evaporation

Q5 Draw and label the human excretory System.

Q functions of kidney, Renal Artery, Ureter, Urinary Bladder.

a. kidney.

- filters Nitrogenous waste (like urea) from the blood.
- maintains the water and salt balance (osmoregulation) in the body.
- Helps regulate blood pressure and produce certain hormones

b. Renal Artery

- Carries oxygenated blood containing waste materials (like urea and excess salts) from the heart to the kidneys for filtration.

c. Ureter

A narrow tube that transports urine from the kidney to the urinary bladder.

d. Urinary Bladder.

A muscular sac that stores urine temporarily until it is excreated from the body.

Q Explain how urine is formed in human kidneys.

Urine is formed in the nephrons, the basic functional units of the kidneys, through the following three main steps.

I. Ultrafiltration

- Blood containing the waste products enters the nephron through glomerulus, a cluster of capillaries.
- Due to high pressure, water, salts, glucose, urea and other small molecules are filtered into Bowman's capsule.
- This filtrate is called the glomerular filtrate.

II Selective Reabsorption

- The filtrate passes through the Renal tubule.
- Useful substances like glucose, amino acids, and most water are reabsorbed into the blood through capillaries surrounding the tubule
- This process ensures that essential substances are not lost.

III Tubular secretion

- Additional waste products like potassium ions, hydrogen ions and drugs are secreted from the blood into the tubule
- This helps maintain the body's acid-base balance and removes excess substances.

Final Step

- The remaining fluid, now called urine, contains water, urea and other waste materials.
- It is collected in the collecting Duct, sent to the ureters, stored in the urinary bladder, and finally excreted through the urethra.

Excretion in plants

Plants excrete by-products such as:

- Carbon Dioxide (from Respiration)
- Oxygen (from photosynthesis)
- Surplus water (via transportation)
- By ~~second~~ Products of Secondary metabolism.

Plant Excretion Mechanisms.

- Gases like oxygen and CO_2 escape via stomata.
- Excess water is removed through transpiration.
- Plants discard old parts such as leaves & Bark.
- Unused materials may accumulate in vacuoles.
- Substances like gum, latex and raisins are stored in old xylem.
- Some waste is also released into the soil.

Q. Plants get rid of waste by.

A. Active transport
B. Diffusion
C. Vomiting
d. lymphatic system.

Q Excretory products in plants are stored in

A. Phloem
B. Vacuoles
C. Xylem
D. Guard cells.

Q Some plants excrete waste in the form of

A. oxygen
B. Carbon Dioxide
C. Resins & gums
D. Water vapour.

Q How do plants excrete their waste? Name two methods.
Plants excrete their waste products in several ways, as they don't have a specialized excretory system like animals.
Two methods of excretion in plants.

Storage in cellular vacuoles

- Waste products such as Resins, gums and oils are stored in vacuoles of cells and may later be discarded when leaf falls (leaf Abscission).

Excretion through stomata lenticeles

- Excess water is removed from the plant body through respiration via stomata (in leaves) and lenticeles (in stems)

Activity 5.2 - Importance of CO_2 in Photosynthesis.

Observation

- Leaf from Bell Jar A (with KOH, no CO_2): No starch formation (no blue-black colour).
- Leaf from Bell Jar B (with CO_2): Starch is formed (turns blue-black).

Conclusion
Carbon dioxide is essential for photosynthesis.
Without it, plants can't produce starch, even in the presence of sunlight.

Q The function of KOH in a photosynthesis experiment is to absorb.

a. Water vapour
[✓ b. CO_2]
c. O_2
d. Chlorophyll

Activity 5.4 - Testing for CO_2 in Exhaled Air.

Observation
Test tube B (exhaled air) turns milky faster than test tube A (atmospheric air).

Conclusion

- Exhaled air has more CO_2 than normal air.
- Lime water turns milky due to calcium carbonate ($CaCO_3$) formation, confirming that CO_2 is released during respiration.

Q What does the lime water experiment (Activity 5.4) tell us about the amount of CO_2 in the air we breathe out?

A It shows that the exhaled air contains more carbon dioxide than inhaled air because lime water turns milky faster with exhaled air.

Q When a few drops of iodine soln are added to rice water the soln turns blue-black in color. This indicates that rice water contains

A. Fats.
B. Glycogen
C. Starch
D. Ethanol.

Q When air blown from mouth into a test tube containing lime water, the lime water turns milky due to the presence of.

A. Oxygen
B. Carbon-Dioxide
C. Nitrogen
D. Water vapour

Q Deficiency of hamoglobin is associated with the following Diseases.

A. Diabetes
B. Thyroid
C. Anemia
D. Night-Blindness.

Blood Pressure

Blood pressure is the force of blood against the walls of arteries

Two Types

Systolic Pressure (120 mmHg): when the heart contracts (pumps blood).

Diastolic Pressure (80 mmHg): when the heart relaxes betn the beats.

- Using a sphygmomanometer (blood pressure cuff) and a ~~Sth~~ stethoscope.

Hypertension

High Blood Pressure also known as hypertension, can damage arteries & increases the risk of heart attack or stroke.

Artificial Kidney (Hemodialysis)

Kidneys remove waste from the blood. as they fail (due to diseases or injury), harmful substances build up. this can be life-threatening.

- There comes the process of hemodialysis, which uses an artificial kidney to clean the blood.

How Hemodialysis work.

- Blood is taken from patient's artery.
- It flows through tubes with a semi-permeable membrane in a dialysing fluid.
- wastes (like urea) move from the blood into the fluid by diffusion.
- Clean blood is returned to the body